

IN THE CLAIMS:

1. (Currently Amended) A pelletizing die, comprising:

a pelletizing die member with a die exit side exposed to cooling fluid and a die entry side for receiving polymer fed thereto, the pelletizing die member comprising:

a plurality of polymer channels;

5 a plurality of extrusion orifices, each of said extrusion orifices being connected to a respective one of said polymer channels to form an extrusion orifice section;

heating medium conduits, each heating medium conduit connected to an undivided circumferential header including an inlet and an outlet forming a heating medium system, said heating medium conduits including at least one conduit adjacent to each polymer channel and  
10 at least one transition zone conduit between adjacent channels and adjacent to the transition zone of each of said extrusion orifices for uniformly heating polymer in each extrusion orifice, and for heating the polymer channel through a sufficiently large even pressure drop supplied by said undivided circumferential header; and

15 a closed thermal stabilization cavity adjacent to each extrusion orifice in an associated one of said extrusion orifice sections, said thermal stabilization cavity defining a thermal stabilization zone between said die exit side exposed to cooling fluid and said heating medium conduits allowing the polymer to remain in a liquid state up to solidification just as the polymer exits the extrusion orifice.

2. (Original) A pelletizing die according to claim 1, wherein said thermal stabilization

cavity includes a space surrounding each extrusion orifice section at a location inwardly of said die exit side to provide thermal stabilization from the cooling effects of the cooling fluid.

3. (Original) A pelletizing die according to claim 1, wherein said thermal stabilization cavity includes a space extending between each extrusion orifice section at a location inwardly of said die exit side to provide thermal stabilization from the cooling effects of the cooling fluid.

4. (Original) A pelletizing die according to claim 1, wherein said thermal stabilization cavity includes a space extending substantially circumferentially between each extrusion orifice section at a location inwardly of said die exit side to provide thermal stabilization from the cooling effects of the cooling fluid.

5. (Original) A pelletizing die according to claim 1, wherein said thermal stabilization cavity includes a space extending substantially radially between each extrusion orifice within each extrusion orifice section at a location inwardly of said die exit side to provide thermal stabilization from the cooling effects of the cooling fluid.

6. (Previously Presented) A pelletizing die according to claim 1, wherein said thermal stabilization cavity is filled with a heat transfer media that provides good heat transfer characteristics.

7. (Original) A pelletizing die according to claim 1, wherein said thermal stabilization cavity transports heat through a convective, radiative and conductive medium.

8. (Currently Amended) A pelletizing die[[.]] comprising:

a pelletizing die member with a die exit side exposed to cooling fluid and a die entry side for receiving polymer fed thereto, the pelletizing die member comprising:

a plurality of polymer channels;

5 a plurality of extrusion orifices connected to a respective one of said polymer channels to form an extrusion orifice section;

heating medium conduits forming a heating medium system, said heating medium conduits including at least one conduit adjacent to each polymer channel for heating the polymer channel; [[and]]

10 a polymer channel to extrusion orifice transition zone defining means for preventing melt-fracture including a polymer channel connected to each of said extrusion orifices having a geometry based on specific polymer characteristics with related optimal pressures, and flow rates that eliminate melt fracture of the particular polymer and having said polymer characteristics with thermal transition of the polymer for optimal pellet quality; and

15 a thermal stabilizing cavity adjacent to each of said extrusion orifices in an associated said extrusion orifice section, said thermal stabilization cavity defining a thermal stabilization zone between said die exit side exposed to cooling fluid and said heating medium conduits allowing the polymer to remain in a liquid state up to solidification just as the polymer exits

the extrusion orifice.

9 - 10. (Canceled).

11. (Currently Amended) A pelletizing die according to claim [[10]] 16, wherein said heating medium system includes a heating medium conduit radially outwardly of each extrusion orifice section and adjacent to each of said channels with said transition zone conduits surrounding each of said transition zones.

12. (Currently Amended) A pelletizing die according to claim [[10]] 16, wherein said heating medium system includes a heating medium conduit radially inwardly of each extrusion orifice section and adjacent to each of said channels.

13. (Currently Amended) A pelletizing die according to claim [[10]] 16, wherein said heating medium system includes another heating medium conduit between adjacent channels.

14. (Currently Amended) A pelletizing die according to claim [[10]] 16, wherein said heating medium system includes a supply heating medium conduit radially outwardly of each extrusion orifice section and adjacent to each of said channels, said supply heating medium conduit being connected to said transition zone conduits for supplying heating medium to said transition zone conduits, additional heating medium conduits between adjacent channels and

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an intermediate heating medium conduit radially inwardly of each extrusion orifice section and adjacent to each of said channels, said intermediate heating medium conduit being connected to said transition zone conduits and being connected to said additional heating medium conduits for transferring heating medium between said transition zone conduits and said additional heating medium conduits for even heat distribution to the polymer based on once in and once out heating medium flow.

15. (Original) A pelletizing die according to claim 14, wherein said supply conduit is an inlet header extending circumferentially about said polymer channels to provide essentially equal pressure and flow to the entry of each of said transition zone channels and with a discharge header extending circumferentially about said polymer channels and connected to each of said additional channels, said discharge header having a geometry to provide equal flow and pressure drop across each of said additional channels.

16. (Previously Presented) A pelletizing die comprising:  
a pelletizing die member with a die exit side exposed to cooling fluid and a die entry side for receiving polymer fed thereto, the pelletizing die member further comprising:  
a plurality of polymer channels;  
a plurality of extrusion orifices connected to a respective one of said polymer channels at an extrusion orifice transition zone to form an extrusion orifice section;  
a heating medium system with an undivided circumferential header including an inlet

and an outlet, said undivided circumferential header feeding a heating medium conduit through a sufficiently large even pressure drop adjacent to each polymer channel for uniformly heating the polymer channel including a transition zone conduit between adjacent channels and adjacent to the transition zone of each of said extrusion orifices for uniformly heating polymer in each extrusion orifice; and

a thermal stabilization cavity adjacent to each extrusion orifice in an associated said extrusion orifice section, said thermal stabilization cavity defining a thermal stabilization zone between said die exit side exposed to cooling fluid and said heating medium conduits allowing the polymer to remain in a liquid state up to solidification just as the polymer exits the extrusion orifice.

17. (Previously Presented) A pelletizing die, comprising a pelletizing die member with a die exit side exposed to cooling fluid and a die entry side for receiving polymer fed thereto, the pelletizing die member comprising:

a plurality of polymer channels;

a plurality of extrusion orifices connected to a respective one of said polymer channels to form an extrusion orifice section;

heating medium conduits forming a heating medium system, said heating medium conduits including at least one conduit adjacent to each polymer channel for heating the polymer channel;

a raised extrusion orifice ring encompassing said extrusion orifice sections; and

a hard face coated onto said raised extrusion orifice ring face, said hard face having a thickness of less than 1mm. and having a hardness level greater than 800 HVO1.

18. (Original) A pelletizing die according to claim 17, further comprising:

a thermal stabilization cavity adjacent to each extrusion orifice in an associated said extrusion orifice section, said thermal stabilization cavity defining a thermal stabilization zone between said die exit side exposed to cooling fluid and said heating medium conduits allowing the polymer to remain in a liquid state up to solidification just as the polymer exists the extrusion orifice.

19 - 22. (Canceled).

23. (Previously Presented) A pelletizing die, comprising a pelletizing die member with a die exit side exposed to cooling fluid and a die entry side for receiving polymer fed thereto, the pelletizing die member comprising:

a plurality of polymer channels;

a plurality of extrusion orifices connected to a respective one of said polymer channels at a transition zone to form an extrusion orifice section;

heating medium conduits forming a heating medium system, said heating medium conduits including at least one conduit adjacent to each polymer channel for heating the polymer channel and at least one transition zone conduit adjacent to said transition zone; and

10 at least a thermal stabilization cavity defined by a continuous closed surface, said cavity  
being adjacent to each extrusion orifice and adjacent to said die exit side in an associated one  
of said extrusion orifice sections, said thermal stabilization cavity defining a thermal  
stabilization zone between said die exit side exposed to cooling fluid and said heating medium  
conduits allowing the polymer to remain in a liquid state up to solidification just as the  
15 polymer exits the extrusion orifice.

24. (Previously Presented) A pelletizing die according to claim 23, wherein said  
thermal stabilization cavity includes at least one of a circular geometric space surrounding said  
plurality of extrusion orifice sections, a longitudinal geometric space alongside said plurality  
of orifice sections, and an interval-filling geometric space between each of said plurality of  
5 orifice sections, at a location inwardly of said die exit side to provide thermal stabilization  
from the cooling effects of the cooling fluid.

25. (Previously Presented) A pelletizing die according to claim 23, wherein said  
thermal stabilization cavity transmits heat through a convective, radiative and conductive  
medium.